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(54) Title of Invention: Soldering iron

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Specification

1. Title of Invention

Soldering iron

2. What is claimed is

A soldering iron having a heat pipe in which a chip for melting solder is attached in an edge section of the heat pipe, and a heating section in which a heating element is attached in the circumference of the heat pipe, wherein the circumference of said heating section is covered with a coating layer, a detachable attachment tool is provided in the circumference of the coating layer, a grip is firmly fixed on the attachment tool at a predetermined distance from said coating layer and in

approximately parallel with said heat pipe, and attachment locations and directions of said attachment tool can be discretionary changed according to use conditions.

3. Detailed explanation of the invention

The present invention pertains to a soldering iron in which a heat pipe is used.

In the past, the present applicant suggested a soldering iron which is characterized in that the soldering iron is equipped with a tip section comprising a chip for melting solder provided on an edge section of a heat pipe, a grip section composed of a heat insulating material provided in the area surrounding a predetermined parts of said heat pipe, and a heating element to heat said heat pipe. The heat pipe had a property in that it was inevitable to have a temperature increase in the entire soldering iron when it was used continuously for a long period of time, because the temperature increases to an approximately same temperature in the overall length of the heat pipe. This phenomenon did not have any major impact on the actual use of the soldering iron. However, when the heat insulating material in the grip section was made sufficiently thicker to prevent the temperature increase in the grip section,

the diameter of the grip section became larger, and thus there was a disadvantage in that it became difficult to operate the soldering iron. Not only that it was hard to grip because of the large diameter, but the difficulties for operation also included problems such that an unnatural position was required in order to observe the tip of the soldering iron closely when the diameter of the grip section was too large, and since it was difficult to grip the grip section of the iron with fingertips, operating the tip section of the soldering iron subtly was difficult in the case of a refined soldering operation.

The present invention is to solve the issues in the above and to implement countermeasures for the temperature increase in a soldering iron using a heat pipe, while providing a soldering iron with an easy-to-operate structure that is suitable for a wide range of operations by utilizing characteristics of the heat pipe.

An example of the present invention is explained in the below in accordance with figures.

Figure 1 a diagram in which a soldering iron with the structure of the present invention and an example of how it is used are shown. In Figure 1, 1 is a heat pipe, 2 is a tip section to which a chip for melting solder is attached, 3 is a heating element, 4 is a coating layer comprising a heat insulating material, and 5 is an attachment tool to attach the grip which will be described later to the circumference of coating layer 4. 6 is a grip of a size of a pencil with a large diameter or a fountain pen (called a pencil shaped grip hereafter), and it is attached by attachment tool 5 to the soldering iron in a cantilever condition. This pencil shaped grip 6 is maintained so that it is distant from the surface of solder iron 9 with a predetermined clearance, for instance 10 millimeters or longer to enable a user to hold it without touching solder iron 9. Moreover, the structure of the present invention is also characterized in that the grip is maintained to be approximately parallel to heat pipe 1 so that an operator can feel that it is integrated with heat pipe1 and its tip section 2 when gripped. Attachment tool 5 has a structure in which the tool is easily attached and detached. Figure 2 through Figure 6 show other examples, and each figure shows a case of different attachment location and attachment direction of grip 6 with a cantilever structure. In Figure 2 through Figure 6, the attachment direction of grip 6 may be changed without detaching attachment tool 5, but through a structure in which a supporting point is provided on an arm connecting grip 6 and attachment tool 5 and grip 6 is simply rotated 180 degrees to change the direction. However, such a simple and firm structure as shown in each example is more desirable in order for a user to feel it when tip section 2 of iron 9 comes in contact with an object to be attached. 7 is a power cord and 8 is an object to be soldered and attached. Soldering iron 9 using a heat pipe in the present invention has such a structure mentioned in the above. Therefore, it resists an increase in the temperature of an entire iron due to an increase in the temperature of an entire pipe to the same temperature as the soldering attachment temperature, which is a significant advantage

of a heat pipe and a disadvantage as well. Hence, it enables a soldering operation for a long period of time. Furthermore, the cantilever pencil shaped grip is attached almost in apparel to the heat pipe. Therefore, it has an advantage in that an operator feels that the grip is integrated with a chip for melting solder which is located in the tip section of the heat pipe, and thus operating it is extremely easy. In addition, because of this structure, the heat insulating layer can be made relatively thin without much concern for an increase in temperature of circumference of the iron or a loss of heat. Therefore soldering operation can be conducted while closely observing the tip of the chip for solder melting without any difficulty.

Further, with soldering iron 9 related to the present invention, positions and directions of the cantilever pencil shaped grip can be changed easily according to the location and shape of an object to be soldered and attached, precision and so forth, or depending on a preference of an

operator. Hence, an attaching operation can be conducted efficiently. This is very important because it was commonly experienced that in an attaching operation by a solder, the operation efficiency and the reliability of attachment is greatly influenced by operator's skill or how it feels in the operator's hand. In the below, in reference to figures, examples are explained in terms of characteristics of each iron in attachment locations and directions of grip 6 of the soldering iron of the present invention.

Such attachment of grip 6 as shown in Figure 1 and Figure 3 are suitable for cases in which users conduct operations by gripping the soldering iron as they hold an electric smoothing iron. In these cases, operation can be conducted efficiently when attachments are relatively imprecise or when objects to be attached are large. The difference between Figure 1 and Figure 3 is that in Figure 1, the force applied on the tip portion of tip section 2 is more flexible and elastic compared to the case of Figure 3. This is an effect generated from a difference in the distance between where grip 6 is attached and chip tip section 2. Therefore, the example of Figure 1 is more suitable compared to the example of Figure 3, for the case in which object to be attached 8 is flexible or its thickness is small. Besides, Figure 1 and Figure 3 are suitable for the cases in which on operations are conducted on (illegible) side of object to be attached 8 from below. When Figure 1 and Figure 3 are reviewed upside down, it can be easily understood. Figure 2 and Figure 4 are ideal for cases in which users conduct operations while gripping the soldering iron as they hold a pencil or a pen. Hence, it is extremely useful for a soldering attachment that is fine and precise.

The difference between Figure 2 and Figure 4 is that based on a similar reason with the previously mentioned reason, the contact between chip tip section 2 and object to be attached 8 is softer in the example of Figure 2. However, for skilled operators, they can more precisely convey subtle feelings of their fingertips to chip tip section 2 in the example of Figure 4. Yet, there is an advantage with the example of Figure 2 in that a field of vision during operation is wider compared to that in the example of Figure 4.

In the example of Figure 5, an operation can be conducted by holding the soldering iron as shown in Figure 1 and Figure 3, or by holding it as how to grip a driver. A major characteristic of this example is that the field of vision is significantly wider compared to that in examples in Figure 1 and Figure 3. A disadvantage in this case is that since the distance between operator's fingers and chip tip section 2 is long, it is totally inappropriate for a fine and precise soldering attachment. However, for a large object to be attached and for a coarse attachment, an operation can be conducted with an excellent efficiency.

the example of Figure 6 is suitable for conducting an operation by holding a soldering iron as if to hold an ice ax. As for an object of attachment, it is appropriate for a case in which there are many spot

attachments. It is useful in soldering for print substrates and the like when relatively low precision is required.

A soldering iron using a heat pipe has an excellent thermal efficiency, and the solder melting speed is high. In addition, since a chip for melting solder is small in size, soldering attachment can be conducted regardless of large or small size of objects to be attached, high or low thermal conductivity, preciseness or roughness of attachment, and so forth. In the soldering iron using a heat pipe with the structure of the present invention, the soldering iron can be used for a variety of purposes by changing attachment positions and directions of the above mentioned cantilever pencil shaped grip. Therefore, it can be said that the soldering iron of the present invention has an ideal structure in which its characteristics are fully utilized compared to an ordinary soldering iron using a heat pipe.

According to the soldering iron of the present invention described in the above, a soldering iron

which is suitable for a wide range of operations can be obtained by utilizing characteristics of a heat pipe, and a soldering iron which provides sufficient countermeasures for a temperature increase and is useful can be obtained.

4. Brief explanation of figures

Figure 1 is a front elevational view of a schematic constitution to show one example of the present invention. Figure 2 through Figure 6 are front elevational views in which other examples of the present invention are shown.

1: Heat pipe
2: Chip tip section
3: Heating element
4: Coating layer
5: Attachment tool
6: Grip
7: Cord
8: Objected to soldered and attached

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Figure 1

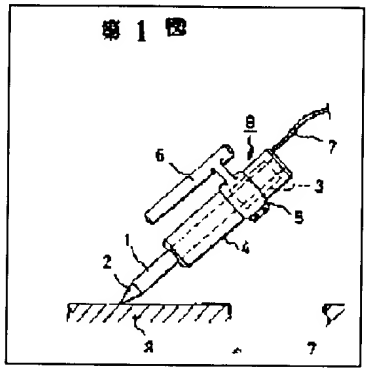

Figure 2

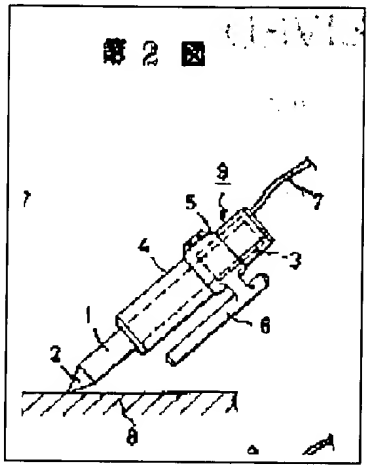

Figure 3

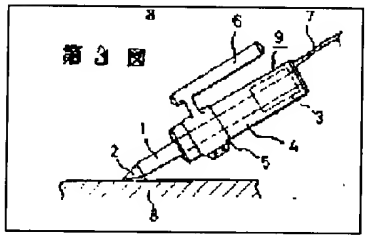

Figure 4

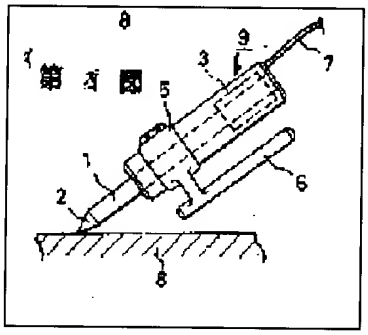

Figure 5

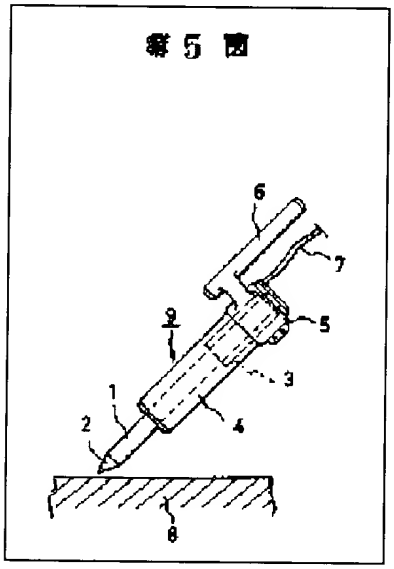

Figure 6